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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,230	04/26/2006	Yoshinobu Abe	2006_0603A	3399

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EXAMINER	
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ART UNIT	PAPER NUMBER
1796	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,230	ABE ET AL.	
	Examiner	Art Unit	
	Ling-Siu Choi	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/13/06, 4/26/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to the Preliminary Amendment filed 04/26/2006. claim 1 was canceled and claims 2-10 are now pending.

Claim Rejections - 35 USC § 112

2. **The following is a quotation of the second paragraph of 35 U.S.C. 112:**

> **The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.**

3. Claims 2-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2-6, lines 2-3; Claim 9, line 1; and Claim 10, lines 1-2, the recitation "average molecular weight" causes indefiniteness. Is it referred to weight average molecular weight, number average molecular weight, or something else?

Claim Analysis

4. Summary of Claim 2:

A crosslinking agent or a curing agent for resins, the agent containing		
	a polyacrylic hydrazide as an active component, having	
		an average molecular weight of 70,000 to 150,000
		a hydrazide conversion ratio of at least 45%
		400 or more hydrazide groups in one molecule

Summary of Claim 3:

A crosslinking agent or a curing agent for resins, the agent containing		
	a polyacrylic hydrazide as an active component, having	
		an average molecular weight of 80,000 to 110,000
		a hydrazide conversion ratio of at least 45%
		450 or more hydrazide groups in one molecule

Summary of Claim 4:

A crosslinking agent or a curing agent for resins, the agent containing		
	a polyacrylic hydrazide as an active component, having	
		an average molecular weight of 80,000 to 90,000
		a hydrazide conversion ratio of at least 50%
		500 or more hydrazide groups in one molecule

Summary of Claim 5:

A crosslinking agent or a curing agent for resins, the agent containing		
	a polyacrylic hydrazide as an active component, having	
		an average molecular weight of 20,000 to 40,000
		a hydrazide conversion ratio of at least 65%
		150 or more hydrazide groups in one molecule

Summary of Claim 6:

A crosslinking agent or a curing agent for resins, the agent containing		
	a polyacrylic hydrazide as an active component, having	
		an average molecular weight of 20,000 to 35,000
		a hydrazide conversion ratio of at least 65%
		150 or more hydrazide groups in one molecule

Summary of Claim 9:

A polyacrylic hydrazide having	
	an average molecular weight of 20,000 to 30,000
	a hydrazide conversion ratio of at least 70%

Summary of Claim 10:

A polyacrylic hydrazide having	
	an average molecular weight of 70,000 to 86,000
	a hydrazide conversion ratio of at least 50%

Claim Rejections - 35 USC § 102

5. **The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:**

> **A person shall be entitled to a patent unless –**
> **(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.**

6. Claims 5-6 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Hartman et al. (US 4,171,413).

Hartman et al. disclose an acrylic polymer containing hydrazide groups comprising the reaction product of (A) an addition polymer formed by vinyl polymerization of 1 to 20 wt% of an α, β - ethylenically unsaturated carboxylic acid and 80 to 99 wt% of at least one vinyl monomer at least a portion of which contains a functional group which is reactive with hydrazine to form hydrazide groups, the vinyl monomer being acrylamide or methacrylamide, and (B) 5 to 40 mol % of hydrazine or an alkyl substituted hydrazine based on total moles of monomers used, wherein the moles of hydrazine or alkyl substituted hydrazine do not exceed the moles of monomers containing functional groups reactive with the hydrazine and the amount of hydrazine used ranges from as low as 1 mole percent to as high as 90 mole percent (col. 3, lines 18-21; col. 4, lines 18-20; claims 1 and 8-9). Hartman et al. further disclose "If polymers

of relatively low molecular weight are desired (for example, below 40,000) so that they can be dissolved at high solids and low viscosities, a chain modifying agent or chain transfer agent is ordinarily added to the polymerization mixture" (col. 3, lines 27-31). Thus, the present claims are anticipated by the disclosure of Hartman et al.

Claim Rejections - 35 USC § 103

7. **The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:**

> **(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.**

8. Claims 3-4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hartman et al. (US 4,171,413).

Hartman et al. disclose an acrylic polymer containing hydrazide groups comprising the reaction product of (A) an addition polymer formed by vinyl polymerization of 1 to 20 wt% of an α, β - ethylenically unsaturated carboxylic acid and 80 to 99 wt% of at least one vinyl monomer at least a portion of which contains a functional group which is reactive with hydrazine to form hydrazide groups, the vinyl monomer being acrylamide or methacrylamide, and (B) 5 to 40 mol % of hydrazine or an alkyl substituted hydrazine based on total moles of monomers used, wherein the

moles of hydrazine or alkyl substituted hydrazine do not exceed the moles of monomers containing functional groups reactive with the hydrazine and the amount of hydrazine used ranges from as low as 1 mole percent to as high as 90 mole percent (col. 3, lines 18-21; col. 4, lines 18-20; claims 1 and 8-9).

The difference between the present claims and the disclosure of Hartman et al. is the requirement of the polyacrylic hydarzide having specific range of average molecular weight.

Hartman et al. disclose "[p]referably, the molecular weight of the addition polymer used in the practice of the invention is at least 3,000 and more preferably between 5,000 and 300,000 on a weight average basis. Polymers with molecular weights above 300,000 have very high viscosities for coating applications and must be diluted to very low solids content to be usable. Addition polymers as used in the practice of the invention with molecular weights below 5,000 are very difficult to prepare (col. 3, lines 18-26). The caselaw has held that "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieved a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." *In re Antonie*, 559 f.2d 618, 195 USPQ 6 (CCPA 1977). Since the molecular weight is recognized by Hartman et al. as result-effective variable, it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the molecular weight of the polyacrylic hydrazide by routine optimization and thereby obtain the present invention.

9. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (JP 62-072742) in view of Hartman et al. (US 4,171,413).

Abe et al. disclose an aqueous dispersion composition of self-crosslinkable resin obtained by mixing (A) an aqueous dispersion of an acrylic copolymer having ≥ 2 hydrazine residues with (B) an aqueous dispersion of a carbonyl-containing copolymer, wherein the component (A) is obtained by reacting hydrazine hydrate to an aqueous dispersion of an acrylic copolymer having amide group (abstract).

The difference between the present claims and the disclosure of Abe et al. is the requirement of polyacrylic hydrazide having specific average molecular weight to be used in the present claims.

Hartman et al. disclose an acrylic polymer containing hydrazide groups comprising the reaction product of (A) an addition polymer formed by vinyl polymerization of 1 to 20 wt% of an α, β - ethylenically unsaturated carboxylic acid and 80 to 99 wt% of at least one vinyl monomer at least a portion of which contains a functional group which is reactive with hydrazine to form hydrazide groups, the vinyl monomer being acrylamide or methacrylamide, and (B) 5 to 40 mol % of hydrazine or an alkyl substituted hydrazine based on total moles of monomers used (col. 3, lines 18-21; col. 4, lines 18-20; claims 1 and 8-9). Hartman et al. disclose "[p]referably, the molecular weight of the addition polymer used in the practice of the invention is at least 3,000 and more preferably between 5,000 and 300,000 on a weight average basis. Polymers with molecular weights above 300,000 have very high viscosities for coating applications and must be diluted to very low solids content to be usable. Addition

polymers as used in the practice of the invention with molecular weights below 5,000 are very difficult to prepare (col. 3, lines 18-26). in light of such benefit, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize polyacrylic hydrazide having the specific molecular weight in the disclosure of Abe et al. and thereby obtain the present invention.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling-Siu Choi whose telephone number is 571-272-1098.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on 571-272-1114.

LING-SUI CHOI
PRIMARY EXAMINER

December 7, 2007